WHAT IS CLAIMED IS:

1. A system for calculating an image of a radioactivity emitting source in a system-of-coordinates, the system comprising:

a radioactive emission probe, of a variable-course motion;

a position tracking system, being in communicating with the radioactive emission probe; and

a data processor, being designed and configured for receiving data inputs from the position tracking system and from the radioactive emission probe and for constructing the image of the radioactivity emitting source in the system-of-coordinates.

2. The system of claim 1, wherein the variable-course motion includes free-hand scanning.

3. The system of claim 1, wherein the variable-course motion includes motion along a body lumen.

4. The system of claim 1, wherein the variable-course motion includes endoscopic motion, through a trucar valve.

5. The system of claim 1, wherein the variable-course motion includes motion on a linkage system.

6. The system of claim 1, wherein the image acquisition is performed with a wide-aperture collimator.

7. The system of claim 1, wherein the data processor is further designed and configured to utilize an image acquisition and reconstruction algorithm, based on wide-aperture collimation – deconvolution algorithms, for image resolution enhancement.

8. The system of claim 1, wherein the radioactive emission probe is constructed as a wide-bore-collimator probe.

9. The system of claim 1, wherein the radioactive emission probe is constructed as a wide-angle collimator probe.

10. The system of claim 1, wherein the radioactive emission probe is constructed as a square collimator probe.

11. The system of claim 1, wherein the radioactive emission probe includes a single-pixel radiation detector and a single collimator.

12. The system of claim 1, wherein the radioactive emission probe includes a multi-pixel radiation detector and a single collimator.

13. The system of claim 1, wherein the radioactive emission probe is constructed as a grid collimator probe, having a plurality of collimator cells.

14. The system of claim 13, wherein each of the collimator cells includes a single pixel.

15. The system of claim 13, wherein each of the collimator cells includes a plurality of pixels.

16. The system of claim 1, wherein the radioactive emission probe includes at least two radiation detectors, each with a dedicated collimator.

17. The system of claim 16, wherein the dedicated collimators are not parallel to each other.

18. The system of claim 1, wherein the radioactive emission probe is selected from the group consisting of a narrow-angle radioactive emission probe, a

wide-angle radiation emission detector, a plurality of individual narrow angle radiation emission detectors, a spatially sensitive, pixelated, radioactivity detector, a Compton gamma probe, a tube collimator, a d tector sensetive to gamma radiation, a detector sensetive to beta radiation, a detector sensetive to positron radiation, a detector sensetive to alpha radiation, and a combination thereof.

19. The system of claim 1, wherein the radioactive emission probe is operative as a position tracking pointer, by following a three dimensional surface which defines the body curvatures, to define the position of the radioactivity-emitting source with respect to an outer surface of the body and create a three dimensional map of both the radioactivity-emitting source and the body.

20. The system of claim 19, and further including a visual co-presentation of the radioactive emission probe.

21. The system of claim 1, adapted for generating an image of the radioactivity-emitting source, selected from the group consisting of a two-dimensional image and a three dimensional image of count rates as functions of positions.

22. The system of claim 1, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

23. The system of claim 1, wherein the position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radio frequency based position tracking system, an electromagnetic field based position tracking system, an

optical based position tracking system, a position tracking system adapted for free-hand movment, and a combination thereof.

24. The system of claim 1, wherein the data processor is further designed and configured for calculating a first position of the radioactivity-emitting source in a first system-of-coordinates and projecting the first position onto a second system-of-coordinates.

25. The system of claim 1, and further including a structural imaging modality in communication with a structural-modality position tracking system, for constructing a structural image of a body component in astructural modality system-of-coordinates, wherein the radioactivity emitting source is a radiopharmaceutically labeled portion of the body component, and wherein the data processor is further designed and configured for constructing the structural image of the body component and the image of the radiopharmaceutically labeled portion of the body component in a common system-of-coordinates.

26. The system of claim 25, wherein the structural imaging modality is a two-dimensional imaging modality.

27. The system of claim 25, wherein the structural imaging modality is a three-dimensional imaging modality.

28. The system of claim 25, adapted for a visual co-presentation of the body component and the radiopharmaceutically labeled portion of the body component.

29. The system of claim 25, wherein the structural imaging modality is selected from the group consisting of a fluoroscope, a computed tomographer, a magnetic resonance imager, an ultrasound imager, an impedance imager, and an optical camera.

30. The system of claim 1, and further including a structural imaging modality in communication with the position tracking system, wherein the data processor is further designed and configured for constructing a structural image of the body component and the image of the radioactivity emitting source in a common system-of-coordinates.

31. The system of claim 1, wherein the radioactive emission probe is an intracorporeal radioactive emission probe.

32. The system of claim 31, wherein the radioactive emission probe is an intracorporeal radioactive emission probe, mounted on a surgical instrument.

33. The system of claim 32, wherein the surgical instrument is selected from the group consisting of laser probes, cardiac and angioplastic catheters, endoscopic probes, biopsy needles, aspiration tubes or needles, resectoscopes, resecting devices, ablation devices, high-energy ultrasound ablation devices, tissue sampling devices, ultrasonic probes, fiber optic scopes, laparoscopy probes, thermal probes, suction probes, irrigation probes, and open-surgery devices.

34. The system of claim 31, wherein the intracorporeal radioactive emission probe is adapted for detecting radiation, selected from the group consisting of gamma radiation, low-energy gamma radiation, beta radiation, positron radiation, and a combination thereof.

35. The system of claim 31, adapted for visual co-presentation at least of the position of the intracorporeal radioactive emission probe and of the radioactivity-emitting source, wherein the intracorporeal radioactive emission probe may thus be used as a pointing device.

36. The system of claim 1, wherein the radioactive emission probe is an extracorporeal radioactive emission probe, and further including a surgical device, in communication with a surgical position tracking system, for tracking the position of

the surgical instrument in a surgical-instrument system-of-coordinates, wherein the data processor is further designed and configured for constructing the image of the radioactivity emitting source and the position of the surgical instrument in a common system-of-coordinates.

37. The system of claim 36, wherein the surgical instrument is selected from the group consisting of laser probes, cardiac and angioplastic catheters, endoscopic probes, biopsy needles, aspiration tubes or needles, resectoscopes, resecting devices, tissue sampling devices, ultrasonic probes, fiber optic scopes, laparoscopy probes, thermal probes, suction probes, irrigation probes, and open-surgery devices.

38. The system of claim 36, wherein the surgical instrument further includes a surgical-instrument, intracorporeal, radioactive emission probe.

39. The system of claim 38, wherein the radioactivity-emitting source is a labeled with a radiopharmaceutical, particularly suited for tandem operation of extracorporeal and intracorporeal radioactive emission probes.

40. The system of claim 36, adapted for visual co-presentation at least of the position of the extracorporeal radioactive emission probe, the surgical instrument, and the radioactivity-emitting source, wherein the surgical instrument may thus be used as a pointing device.

41. The system of claim 1, and further including a memory unit, for storing the inputs.

42. The system of claim 1, wherein the data processor is further designed and configured for refining the inputs.

43. A method for defining an image of a radioactivity emitting source in a system-of-coordinates, the method comprising:

scanning, in a variable-course motion, a radioactivity emitting source with a radioactive emission probe;

monitoring a position of the a radioactive emission probe, as it scans the radioactivity emitting source;

data processing the scanning and the monitoring; and

constructing a first image of the radioactivity emitting source, by the data processing.

44. The method of claim 43, wherein the variable-course motion includes free-hand scanning.

45. The method of claim 43, wherein the variable-course motion includes motion along a body lumen.

46. The method of claim 43, wherein the variable-course motion includes endoscopic motion, through a trucar valve.

47. The method of claim 43, wherein the variable-course motion includes motion on a linkage system.

48. The method of claim 43, wherein the monitoring takes place at very short time intervals of between 100 and 200 miliseconds.

49. The method of claim 43, wherein the data processing further includes utilizing wide-aperture collimation – deconvolution algorithms.

50. The method of claim 43, wherein the first image acquisition is performed with a wide-aperture collimator.

51. The method of claim 43, wherein the radioactive emission probe is a wide-bore-collimator probe.

52. The method of claim 43, wherein the radioactive emission probe is a wide-angle collimator probe.

53. The method of claim 43, wherein the radioactive emission probe is a square collimator probe.

54. The method of claim 43, wherein the radioactive emission probe includes a single-pixel radiation detector and a single collimator.

55. The method of claim 43, wherein the radioactive emission probe includes a multi-pixel radiation detector and a single collimator.

56. The method of claim 43, wherein the radioactive emission probe is a grid collimator probe, having a plurality of collimator cells.

57. The method of claim 56, wherein each of the collimator cells includes a single pixel.

58. The method of claim 56, wherein each of the collimator cells includes a plurality of pixels.

59. The method of claim 43, wherein the radioactive emission probe includes at least two radiation detectors, each with a dedicated collimator.

60. The method of claim 59, wherein the dedicated collimators are not parallel to each other.

61. The method of claim 43, wherein constructing includes constructing the first image in two dimensions.

62. The method of claim 43, wherein constructing includes constructing the first image in three dimensions.

63. The method of claim 43, wherein the data processing further includes calculating a distance between the radioactive emission probe and the radioactivity emitting source, at each position, based on the different attenuation of photons of different energies, emitted from the radioactivity emitting source.

64. The method of claim 63, and further including constructing a second image of the radioactivity emitting source, by the data processing, based on the distance between the radioactive emission probe and the radioactivity emitting source at each position.

65. The method of claim 64, and further including visually co-presenting the first and second images on a display screen.

66. The method of claim 43, wherein the radioactive emission probe is selected from the group consisting of a narrow-angle radioactive emission probe, a wide-angle radiation emission detector, a plurality of individual narrow angle radiation emission detectors, a spatially sensitive, pixelated, radioactivity detector, a Compton gamma probe, a tube collimator, a detector sensetive to gamma radiation, a detector sensetive to beta radiation, a detector sensetive to positron radiation, a detector sensetive to alpha radiation, and a combination thereof.

67. The method of claim 43, wherein the radioactive emission probe is operative as a position tracking pointer, by following a three dimensional surface which defines the body curvatures, to define the position of the radioactivity-emitting source with respect to an outer surface of the body and create a three dimensional map of both the radioactivity-emitting source and the body.

68. The method of claim 67, and further including visually co-presenting the radioactive emission probe.

69. The method of claim 43, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a

radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

70. The method of claim 43, wherein the position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radio frequency based position tracking system, an electromagnetic field based position tracking system, an optical based position tracking system, a position tracking system adapted for free-hand movment, and a combination thereof.

71. The method of claim 43, wherein the data processor is further designed and configured for calculating a first position of the radioactivity-emitting source in a first system-of-coordinates and projecting the first position onto a second system-of-coordinates.

72. The method of claim 43, and further including performing a structural imaging modality, with a structural-modality position tracking system, for constructing a structural image of a body component in a structural modality system-of-coordinates, wherein the radioactivity emitting source is a radiopharmaceutically labeled portion of the body component, and wherein the data processor is further designed and configured for constructing the structural image of the body component and the image of the radiopharmaceutically labeled portion of the body component in a common system-of-coordinates.

73. The method of claim 72, wherein the structural imaging modality is a two-dimensional imaging modality.

74. The method of claim 72, wherein the structural imaging modality is a three-dimensional imaging modality.

75. The method of claim 72, and further including visually co-presenting the body component and the radiopharmaceutically labeled portion of the body component.

76. The method of claim 72, wherein the structural imaging modality is selected from the group consisting of a fluoroscope, a computed tomographer, a magnetic resonance imager, an ultrasound imager, an impedance imager, and an optical camera.

77. The method of claim 43, and further including a structural imaging modality in communication with the position tracking system, wherein the data processor is further designed and configured for constructing a structural image of the body component and the image of the radioactivity emitting source in a common system-of-coordinates.

78. The method of claim 43, wherein thc radioactive emission probe is an intracorporeal radioactive emission probe.

79. The method of claim 78, wherein the radioactive emission probe is an intracorporeal radioactive emission probe, mounted on a surgical instrument.

80. The method of claim 79, wherein the surgical instrument is selected from the group consisting of laser probes, cardiac and angioplastic catheters, endoscopic probes, biopsy needles, aspiration tubes or needles, resectoscopes, resecting devices, ablation devices, high-energy ultrasound ablation devices, tissue sampling devices, ultrasonic probes, fiber optic scopes, laparoscopy probes, thermal probes, suction probes, irrigation probes, and open-surgery devices.

81. The method of claim 78, wherein the intracorporeal radioactive emission probe is adapted for detecting radiation, selected from the group consisting of gamma radiation, low-energy gamma radiation, beta radiation, positron radiation, and a combination thereof.

82. The method of claim 78, and further including visually co-presenting at least the position of the intracorporeal radioactive emission probe and of the radioactivity-emitting source, wherein the intracorporeal radioactive emission probe may thus be used as a pointing device.

83. The method of claim 43, wherein the radioactive emission probe is an extracorporeal radioactive emission probe, and further including a surgical device, in communication with a surgical position tracking system, for tracking the position of the surgical instrument in a surgical-instrument system-of-coordinates, wherein the data processor is further designed and configured for constructing the image of the radioactivity emitting source and the position of the surgical instrument in a common system-of-coordinates.

84. The method of claim 83, wherein the surgical instrument is selected from the group consisting of laser probes, cardiac and angioplastic catheters, endoscopic probes, biopsy needles, aspiration tubes or needles, resectoscopes, resecting devices, tissue sampling devices, ultrasonic probes, fiber optic scopes, laparoscopy probes, thermal probes, suction probes, irrigation probes, and open-surgery devices.

85. The method of claim 83, wherein the surgical instrument further includes a surgical-instrument, intracorporeal, radioactive emission probe.

86. The method of claim 85, wherein the radioactivity-emitting source is a labeled with a radiopharmaceutical, particularly suited for tandem operation of extracorporeal and intracorporeal radioactive emission probes.

87. The method of claim 83, and further including visually co-presenting at least the position of the extracorporeal radioactive emission probe, the surgical instrument, and the radioactivity-emitting source, wherein the surgical instrument may thus be used as a pointing device.

88. The method of claim 43, and further including a memory unit, for storing the inputs.

89. The method of claim 43, wherein the data processor is further designed and configured for refining the inputs.

90. A method of nuclear imaging, comprising:

scanning a radioactivity emitting source with a radioactive emission probe having a wide-aperture collimator;

monitoring the position of the radioactive emission probe;

data processing the scanning and the monitoring, while mathematically correcting the scanning for the effect of wide-aperture; and

constructing a first image of the radioactivity emitting source, by the data processing.

91. The method of claim 90, wherein the monitoring takes place at very short time intervals of between 100 and 200 miliseconds.

92. The method of claim 90, wherein the data processing further includes utilizing wide-aperture collimation – deconvolution algorithms.

93. The method of claim 90, wherein the radioactive emission probe is a wide-bore-collimator probe.

94. The method of claim 90, wherein the radioactive emission probe is a wide-angle collimator probe.

95. The method of claim 90, wherein the radioactive emission probe is a square collimator probe.

96. The method of claim 90, wherein the radioactive emission probe includes a single-pixel radiation detector and a single collimator.

97. The method of claim 90, wherein the radioactive emission probe includes a multi-pixel radiation detector and a single collimator.

98. The method of claim 90, wherein the radioactive emission probe is a grid collimator probe, having a plurality of collimator cells.

99. The method of claim 98, wherein each of the collimator cells includes a single pixel.

100. The method of claim 98, wherein each of the collimator cells includes a plurality of pixels.

101. The method of claim 90, wherein the radioactive emission probe includes at least two radiation detectors, each with a dedicated collimator.

102. The method of claim 101, wherein the dedicated collimators are not parallel to each other.

103. The method of claim 90, wherein constructing includes constructing the first image in two dimensions.

104. The method of claim 90, wherein constructing includes constructing the first image in three dimensions.

105. The method of claim 90, wherein the data processing further includes calculating a distance between the radioactive emission probe and the radioactivity emitting source, at each position, calculating a distance between the radioactive emission probe and the radioactivity emitting source, at each position, based on the different attenuation of photons of different energies, emitted from the radioactivity emitting source.

106. The method of claim 105, and further including constructing a second image of the radioactivity emitting source, by the data processing, based on the distance between the radioactive emission probe and the radioactivity emitting source at each position.

107. The method of claim 106, and further including visually co-presenting the first and second images on a display screen.

108. The method of claim 106, wherein the second image is a two dimensional image.

109. The method of claim 106, wherein the second image is a three dimensional image.

110. A method of nuclear imaging, comprising:

scanning a radioactivity emitting source of at least two photon energies with a radioactive emission probe, and obtaining a count rate for the at least two photons;

monitoring the position of the radioactive emission probe;

calculating the depth of the radioactivity emitting source, at each position, based on the different attenuation of photons of different energies, emitted from the radioactivity emitting source; and

constructing an image of the radioactivity emitting source.

111. The method of claim 110, wherein the monitoring takes place at very short time intervals of between 100 and 200 miliseconds.

112. The method of claim 110, wherein the data processing further includes utilizing wide-aperture collimation – deconvolution algorithms.

113. The method of claim 110, wherein the radioactive emission probe is a wide-bore-collimator probe.

114. The method of claim 110, wherein the radioactive emission probe is a wide-angle collimator probe.

115. The method of claim 110, wherein the radioactive emission probe is a square collimator probe.

116. The method of claim 110, wherein the radioactive emission probe includes a single-pixel radiation detector and a single collimator.

117. The method of claim 110, wherein the radioactive emission probe includes a multi-pixel radiation detector and a single collimator.

118. The method of claim 110, wherein the radioactive emission probe is a grid collimator probe, having a plurality of collimator cells.

119. The method of claim 118, wherein each of the collimator cells includes a single pixel.

120. The method of claim 118, wherein each of the collimator cells includes a plurality of pixels.

121. The method of claim 110, wherein the radioactive emission probe includes at least two radiation detectors, each with a dedicated collimator.

122. The method of claim 121, wherein the dedicated collimators are not parallel to each other.

123. A system for calculating an image of a radioactivity emitting source in a system-of-coordinates, the system comprising:

a radioactive emission probe, of a wide-aperture collimator;

a position tracking system, being in communicating with the radioactive emission probe; and

a data processor, being designed and configured for receiving data inputs from the position tracking system and from the radioactive emission probe and for constructing the image of the radioactivity emitting source in the system-of-coordinates.

124. The system of claim 123, wherein the radioactive emission probe of a wide-aperture collimator is adapted for a variable course motion.

125. The system of claim 124, wherein the variable-course motion includes free-hand scanning.

126. The system of claim 124, wherein the variable-course motion includes motion along a body lumen.

127. The system of claim 124, wherein the variable-course motion includes endoscopic motion, through a trucar valve.

128. The system of claim 124, wherein the variable-course motion includes motion on a linkage system.

129. The system of claim 123, wherein the radioactive emission probe of a wide-aperture collimator is adapted for motion within a predetermined track on an immobile gantry.

130. The system of claim 123, wherein the radioactive emission probe of a wide-aperture collimator is adapted for motion within at least two predetermined tracks on an immobile gantry.

131. The system of claim 123, wherein the radioactive emission probe of a wide-aperture collimator is adapted for a system selected from gamma camera and SPECT.

132. The system of claim 123, wherein the data processor is further designed and configured to utilize an image acquisition and reconstruction algorithm, based on wide-aperture collimation – deconvolution algorithms, for image resolution enhancement.

133. The system of claim 123, wherein the radioactive emission probe is constructed as a wide-bore-collimator probe.

134. The system of claim 123, wherein the radioactive emission probe is constructed as a wide-angle collimator probe.

135. The system of claim 123, wherein the radioactive emission probe is constructed as a square collimator probe.

136. The system of claim 123, wherein the radioactive emission probe includes a single-pixel radiation detector and a single collimator.

137. The system of claim 123, wherein the radioactive emission probe includes a multi-pixel radiation detector and a single collimator.

138. The system of claim 123, wherein the radioactive emission probe is constructed as a grid collimator probe, having a plurality of collimator cells.

139. The system of claim 138, wherein each of the collimator cells includes a single pixel.

140. The system of claim 138, wherein each of the collimator cells includes a plurality of pixels.

141. The system of claim 123, wherein the radioactive emission probe includes at least two radiation detectors, each with a dedicated collimator.

142. The system of claim 141, wherein the dedicated collimators are not parallel to each other.